

1 Article

2 Taxonomic and Metabolite Diversity of Actinomycetes Associated with Three 3 Australian Ascidians

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Table S1 – Ascidian-associated actinomycete collection

Isolate-ID	OTU	Ascidian host	Isolation media	16S rRNA identification	GenBank accession #
USC16000	denovo32	<i>S. rubra</i>	SCA	<i>Streptomyces</i> sp.	MF773756
USC16001	denovo11	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773757
USC16002	denovo69	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773758
USC16003	denovo19	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773759
USC16004	denovo49	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773760
USC16005	denovo43	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773761
USC16006	denovo0	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773762
USC16007	denovo28	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773763
USC16008	denovo68	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773764
USC16009	denovo57	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773765
USC16010	denovo38	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773766
USC16011	denovo10	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773767
USC16012	denovo11	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773768
USC16013	denovo24	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773769
USC16014	denovo34	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773770

USC16015	denovo4	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773771
USC16016	denovo25	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773772
USC16017	denovo29	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773773
USC16018	denovo19	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773774
USC16019	denovo48	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773775
USC16020	denovo48	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773776
USC16021	denovo30	<i>S. rubra</i>	SCA	<i>Streptomyces</i> sp.	MF773777
USC16022	denovo29	<i>A. solidium</i>	CS	<i>Streptomyces</i> sp.	MF773778
USC16023	denovo73	<i>A. solidium</i>	CS	<i>Streptomyces</i> sp.	MF773779
USC16024	denovo27	<i>P. vasculosum</i>	SCA	<i>Streptomyces</i> sp.	MF773780
USC16025	denovo18	<i>P. vasculosum</i>	SCA	<i>Streptomyces</i> sp.	MF773781
USC16026	denovo63	<i>P. vasculosum</i>	CS	<i>Streptomyces</i> sp.	MF773782
USC16027	denovo74	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773783
USC16028	denovo67	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773784
USC16029	denovo67	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773785
USC16030	denovo5	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773786
USC16031	denovo46	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773787
USC16032	denovo67	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773788
USC16033	denovo70	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773789
USC16034	denovo67	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773790
USC16035	denovo23	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773791
USC16036	denovo52	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773792
USC16037	denovo1	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773793
USC16038	denovo71	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773794
USC16039	denovo16	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773795
USC16040	denovo52	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773796
USC16041	denovo12	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773797

Table S1 – Ascidian-associated actinomycete collection (continued)

Isolate-ID	OTU	Ascidian host	Isolation media	16S rRNA identification	GenBank accession #
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USC16042	denovo51	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773798
USC16043	denovo61	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773799
USC16044	denovo56	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773800
USC16045	denovo70	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773801
USC16046	denovo33	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773802
USC16047	denovo37	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773803
USC16048	denovo23	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773804
USC16049	denovo51	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773805
USC16050	denovo52	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773806
USC16051	denovo37	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773807
USC16052	denovo70	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773808
USC16053	denovo50	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773809
USC16054	denovo67	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773810
USC16055	denovo61	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773811
USC16056	denovo8	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773812
USC16057	denovo26	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773813
USC16058	denovo67	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773814
USC16059	denovo52	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773815
USC16060	denovo70	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773816
USC16061	denovo13	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773817
USC16062	denovo31	<i>S. rubra</i>	SCA	<i>Streptomyces</i> sp.	MF773818
USC16063	denovo47	<i>S. rubra</i>	SCA	<i>Streptomyces</i> sp.	MF773819
USC16064	denovo53	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773820
USC16065	denovo67	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773821
USC16066	denovo66	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773822
USC16067	denovo72	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773823
USC16068	denovo36	<i>A. solidium</i>	SCA	<i>Streptomyces</i> sp.	MF773824
USC16069	denovo17	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773825
USC16070	denovo67	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773826
USC16071	denovo72	<i>P. vasculosum</i>	SA	<i>Micromonospora</i> sp.	MF773827
USC16072	denovo70	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773828

USC16073	denovo70	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773829
USC16074	denovo70	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773830
USC16075	denovo70	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773831
USC16076	denovo41	<i>P. vasculosum</i>	SCA	<i>Micromonospora</i> sp.	MF773832
USC16077	denovo39	<i>P. vasculosum</i>	SCA	<i>Micromonospora</i> sp.	MF773833
USC16078	denovo55	<i>P. vasculosum</i>	SCA	<i>Micromonospora</i> sp.	MF773834
USC16079	denovo58	<i>P. vasculosum</i>	SCA	<i>Micromonospora</i> sp.	MF773835
USC16080	denovo22	<i>P. vasculosum</i>	SCA	<i>Micromonospora</i> sp.	MF773836
USC16081	denovo67	<i>P. vasculosum</i>	SA	<i>Micromonospora</i> sp.	MF773837
USC16082	denovo3	<i>P. vasculosum</i>	SA	<i>Micromonospora</i> sp.	MF773838
USC16083	denovo67	<i>P. vasculosum</i>	SCA	<i>Micromonospora</i> sp.	MF773839
USC16084	denovo9	<i>P. vasculosum</i>	SCA	<i>Micromonospora</i> sp.	MF773840
USC16085	denovo2	<i>P. vasculosum</i>	SA	<i>Micromonospora</i> sp.	MF773841
USC16086	denovo51	<i>P. vasculosum</i>	SCA	<i>Micromonospora</i> sp.	MF773842
USC16087	denovo9	<i>P. vasculosum</i>	SCA	<i>Micromonospora</i> sp.	MF773843

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Table S1 – Ascidian-associated actinomycete collection (*continued*)

Isolate-ID	OTU	Ascidian host	Isolation media	16S rRNA identification	GenBank accession #
USC16088	denovo61	<i>P. vasculosum</i>	SA	<i>Micromonospora</i> sp.	MF773844
USC16089	denovo53	<i>P. vasculosum</i>	SA	<i>Micromonospora</i> sp.	MF773845
USC16090	denovo37	<i>P. vasculosum</i>	SA	<i>Micromonospora</i> sp.	MF773846
USC16091	denovo7	<i>A. solidium</i>	CS	<i>Nocardia</i> sp.	MF773847
USC16092	denovo20	<i>S. rubra</i>	CS	<i>Rhodococcus</i> sp.	MF773848
USC16093	denovo7	<i>S. rubra</i>	CS	<i>Nocardia</i> sp.	MF773849
USC16094	denovo14	<i>S. rubra</i>	CS	<i>Rhodococcus</i> sp.	MF773850
USC16095	denovo42	<i>S. rubra</i>	SCA	<i>Nocardia</i> sp.	MF773851
USC16096	denovo45	<i>S. rubra</i>	SCA	<i>Nocardia</i> sp.	MF773852
USC16097	denovo64	<i>S. rubra</i>	SCA	<i>Nocardia</i> sp.	MF773853
USC16098	denovo75	<i>A. solidium</i>	SCA	<i>Streptomyces</i> sp.	MF773854
USC16099	denovo76	<i>A. solidium</i>	SCA	<i>Streptomyces</i> sp.	MF773855

USC16100	denovo6	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773856
USC16101	denovo21	<i>S. rubra</i>	SA	<i>Streptomyces</i> sp.	MF773857
USC16102	denovo52	<i>S. rubra</i>	SA	<i>Micromonospora</i> sp.	MF773858
USC16103	denovo35	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773859
USC16104	denovo70	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773860
USC16105	denovo40	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773861
USC16106	denovo61	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773862
USC16107	denovo54	<i>P. vasculosum</i>	SCA	<i>Micromonospora</i> sp.	MF773863
USC16108	denovo59	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773864
USC16109	denovo61	<i>A. solidium</i>	SCA	<i>Micromonospora</i> sp.	MF773865
USC16110	denovo38	<i>S. rubra</i>	CS	<i>Streptomyces</i> sp.	MF773866
USC16111	denovo62	<i>S. rubra</i>	SCA	<i>Micromonospora</i> sp.	MF773867
USC16112	denovo70	<i>S. rubra</i>	CS	<i>Micromonospora</i> sp.	MF773868
USC16113	denovo60	<i>P. vasculosum</i>	MA	<i>Streptomyces</i> sp.	MF773869
USC16114	denovo67	<i>S. rubra</i>	MA	<i>Micromonospora</i> sp.	MF773870
USC16115	denovo44	<i>S. rubra</i>	MA	<i>Streptomyces</i> sp.	MF773871
USC16117	denovo4	<i>S. rubra</i>	MA	<i>Streptomyces</i> sp.	MF773872
USC16118	denovo4	<i>S. rubra</i>	MA	<i>Streptomyces</i> sp.	MF773873
USC16119	denovo77	<i>S. rubra</i>	MA	<i>Streptosporangium</i> sp.	MF773874
USC16120	denovo7	<i>A. solidium</i>	NH	<i>Nocardia</i> sp.	MF773875

Table S2. Molecular ion table – GNPS library hits

Parent Mass	RT (min)	RT Stderror	LibraryID	<i>S. rubra</i>	<i>A. solidum</i>	<i>P. vasculosum</i>	<i>Symplegma _associate</i>	<i>Aplidium _associate</i>	<i>Polyclinum _associate</i>	<i>Streptomyces</i>	<i>Micromonospora</i>	<i>Streptosporangium</i>	<i>Nocardia</i>	<i>Rhodococcus</i>
495.899	11.83	0.54	1-Palmitoyl-sn-glycero-3-phosphocholine	12	19	11	0	0	3	0	3	0	0	0
479.9	11.48	0.60	4-[5-[[4-[5-[acetyl(hydroxy)amino]pentylamino]-4-oxobutanoyl]-l	25	5	15	9	2	4	0	14	0	1	0
481.929	14.96	4.70	LysoPAF	10	5	1	0	0	0	0	0	0	0	0
411.325	15.58	0.33	NCGC00180497-02!	4	4	0	0	0	5	0	5	0	0	0
474.831	12.60	3.21	SildenafilCitrate	0	2	0	1	0	2	0	3	0	0	0
127.055	1.92	0.01	Thymine	0	2	0	0	0	0	0	0	0	0	0
137.054	1.41	0.02	Hypoxanthine	0	1	0	3	1	2	0	4	2	0	0
105.076	7.46	2.50	Benzaldehyde	0	1	0	1	1	1	1	2	0	0	0
482.369	11.12	4.59	LysoPAF	1	1	0	0	0	0	0	0	0	0	0
261.14	2.44	0.35	gamma-L-Glutamyl-L-leucine	0	0	0	179	43	89	39	208	4	32	3
261.029	3.54	0.10	cyclo(Phe-4-Hyp)	0	0	0	127	20	57	88	94	1	7	2
211.077	3.32	1.02	Cyclo(Pro-Leu)	0	0	0	93	20	24	47	72	1	6	0
247.063	1.84	0.10	gamma-L-Glutamyl-L-valine	0	0	0	64	16	33	22	60	3	14	2
227.075	3.10	0.11	cyclo(L-Leu-L-4-Hyp)	0	0	0	63	18	35	50	52	0	5	0
254.174	1.73	0.02	Pheniramine formamide	0	0	0	55	11	13	39	35	1	1	0
426.648	3.96	0.35	Leupeptin	0	0	0	29	0	0	29	0	0	0	0
1128.73	17.45	2.26	6,18,30-trimethyl-3,9,12,15,21,24,27,33,36-nona(propan-2-yl)-1,7,1	0	0	0	28	0	0	28	0	0	0	0
245.026	4.53	0.03	cyclo(L-Phe-D-Pro)	0	0	0	23	1	8	8	20	0	0	0
309.798	1.97	0.10	Bestatin	0	0	0	20	6	6	15	11	0	4	0
426.277	9.15	0.13	1-tetradecanoyl-sn-glycero-3-phosphoethanolamine	0	0	0	18	1	7	20	6	0	0	0
585.34	2.29	0.03	Desferrioxamine B + Al	0	0	0	18	4	3	0	23	2	0	0
912.889	7.61	0.08	Surugamide_A	0	0	0	15	0	3	18	0	0	0	0
182.091	1.52	0.03	Tyrosine	0	0	0	15	0	1	9	6	0	1	0
188.08	2.76	0.06	Metrazoline	0	0	0	14	0	3	8	6	0	3	0
227.15	3.14	0.12	cyclo(L-Leu-L-4-Hyp)	0	0	0	13	2	6	8	11	1	0	0
132.11	1.45	0.62	Leucine	0	0	1	13	3	4	11	6	0	1	1
197.138	3.10	0.01	cyclo(L-Val-L-Pro)	0	0	0	13	0	1	4	9	0	1	0
260.828	2.46	0.25	gamma-L-Glutamyl-L-leucine	0	0	0	12	6	7	1	16	0	4	0
293.046	1.13	0.02	Vanillylnonanamide	0	0	0	10	0	1	9	1	0	1	0
220.13	2.16	0.06	Vitamin B5	0	0	0	10	0	0	10	0	0	0	0
143.091	1.04	0.01	Ectoine	0	0	0	8	2	1	5	1	0	4	0
169.084	3.59	0.03	Norharmane	0	0	0	6	1	2	3	4	0	0	0
403.758	14.39	0.44	2-(14-methylpentadecanoylamino)-3-phenylpropanoic acid	0	0	0	6	0	1	7	0	0	0	0
621.434	12.89	0.02	Rakicidin B	0	0	0	6	1	0	0	5	2	0	0
487.18	7.02	0.01	(3R)-4-[6-[(2R,4R,5S,6R)-4,5-dihydroxy-6-methyloxan-2-yl]-1,5-di	0	0	0	6	0	0	6	0	0	0	0
118.094	1.32	0.25	Betaine	0	0	0	6	0	0	4	1	0	1	0
310.865	2.23	0.01	gamma-Glutamyltyrosine	0	0	0	6	0	0	0	6	0	0	0
124.047	1.38	0.01	Vitamin B3	0	0	0	5	0	3	2	5	0	0	0
150.068	1.63	0.31	Methionine	0	0	0	5	2	0	0	0	0	5	0
260.887	3.57	0.13	cyclo(Phe-4-Hyp)	0	0	0	5	0	0	2	3	0	0	0
181.607	1.52	0.03	L-Tyrosine	1	0	1	4	0	1	2	3	0	0	0
166.014	1.93	0.14	Phenylalanine	0	0	0	4	0	6	5	5	0	0	0
426.074	9.25	0.09	1-tetradecanoyl-sn-glycero-3-phosphoethanolamine	0	0	0	4	0	2	4	2	0	0	0
597.22	10.24	0.01	(3R)-4-[6-[(2S,4aS,5aR,9R,9aR,10aR)-2,9-dimethyl-3-oxo-4,4a,5a,6	0	0	0	4	0	0	4	0	0	0	0
298.112	2.53	0.02	5'-Methylthioadenosine	0	0	0	4	0	0	2	2	0	0	0

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Table S2. Molecular ion table – GNPS library hits (continued)

parent mass	RT (min)	RT Stderror	LibraryID	<i>S. rubra</i>	<i>A. solidum</i>	<i>P. vasculosum</i>	<i>Symplegma</i> _associate	<i>Aplidium</i> _associate	<i>Polyclinum</i> _associate	<i>Streptomyces</i>	<i>Micromonospora</i>	<i>Streptosporangium</i>	<i>Nocardia</i>	<i>Rhodococcus</i>
429.333	3.94	0.09	Leupeptin hemisulfate salt	0	0	0	4	0	0	4	0	0	0	0
261.136	3.50	0.03	cyclo(Phe-4-Hyp)	0	0	0	3	0	1	2	2	0	0	0
146.101	1.06	0.01	Glutamic acid	0	0	0	3	3	0	0	6	0	0	0
296.325	4.68	0.05	methyl 2-[(3-fomamido-2-hydroxybenzoyl)amino]-3-hydroxybuta	0	0	0	3	0	0	3	0	0	0	0
296.29	4.65	0.03	methyl 2-[(3-fomamido-2-hydroxybenzoyl)amino]-3-hydroxybuta	0	0	0	3	0	0	3	0	0	0	0
267.614	1.72	0.20	Adenosine	2	0	0	2	0	0	1	1	0	0	0
426.387	15.20	0.18	Ethmozine	0	0	0	2	1	2	3	1	0	0	0
153.786	16.47	1.50	Acetamide	0	0	0	2	0	2	2	2	0	0	0
132.11	1.21	0.18	L-Leucine	0	0	0	2	2	1	3	2	0	0	0
267.261	1.61	0.04	Adenosine	0	0	0	2	1	1	1	1	1	0	0
227.147	3.15	0.10	cyclo-[L-(4-hydroxy-Pro)-L-leu]	0	0	0	2	0	1	1	2	0	0	0
526.969	1.10	0.09	Polysaccharide Hexose x3	0	0	0	2	0	1	2	1	0	0	0
364.857	1.06	0.09	sucrose	0	0	0	2	0	1	1	2	0	0	0
178.095	2.19	0.01	3-Amino-3-(4-hydroxyphenyl)propionate	0	0	0	2	0	0	2	0	0	0	0
257.222	6.42	0.01	5-beta-Androstane-3-alpha	0	0	0	2	0	0	2	0	0	0	0
211.118	2.03	0.02	cyclo(L-Leu-L-Pro)	0	0	0	2	0	0	1	1	0	0	0
205.119	1.94	1.22	Tryptophan	0	0	0	2	0	0	1	0	0	1	0
205.107	2.75	0.08	Tryptophan	0	0	0	2	0	0	2	0	0	0	0
152.066	1.39	0.28	Xanthine	3	0	0	1	0	0	0	1	0	0	0
144.089	3.23	0.22	Quinolin-4-ol	0	0	0	1	2	2	1	4	0	0	0
227.149	3.25	0.02	cyclo(L-Leu-L-4-hydroxy-Pro)	0	0	0	1	0	1	1	1	0	0	0
247.141	1.88	0.07	gamma-L-Glutamyl-L-valine	0	0	0	1	0	0	0	1	0	0	0
194.572	2.15	0.53	Caffeine	12	0	0	0	0	0	0	0	0	0	0
429.023	4.81	0.03	8-desoxyenterocin	0	0	0	0	0	12	12	0	0	0	0
521.431	11.18	0.55	1-Oleoyl-sn-glycero-3-phosphocholine	0	0	2	0	0	4	0	4	0	0	0
245.139	4.55	0.02	cyclo(L-Phe-D-Pro)	0	0	0	0	1	1	1	1	0	0	0
592.93	14.85	0.02	Pheophorbide A	0	0	3	0	0	0	0	0	0	0	0
154.165	16.51	2.59	Xanthine	0	0	1	0	1	0	1	0	0	0	0
154.167	18.16	0.04	L-Histidine	0	0	0	0	1	0	1	0	0	0	0

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